REMARKS

This Amendment amends claims 1, 3, and 8 in accordance with the original disclosure. Support for the claim amendments is found, for example, in Fig. 1 of the drawings and paragraphs 0039 and 0041 of the specification. Claims 1-12 and 14-24 remain in this application.

Allowed Claims

Claims 14-18 are allowed.

Rejections under 35 U.S.C. § 102(b)

Claims 1, 4, and 19-24 stand rejected under 35 U.S.C. § 102(b) for anticipation by U.S. Patent No. 5,127,485 to Wakuta et al. In view of the above amendments and the following remarks, Applicant respectfully requests reconsideration of these rejections.

Claim 1, as amended, is directed to a fork lift truck drive comprising a traction drive system having a drive axle with at least one drive wheel located on each end of the drive axle. The drive axle has an axle housing that is substantially closed on all sides and is provided for connection with a vehicle frame. The drive device also includes a hydraulic work system comprising a hoisting cylinder and/or a tilting cylinder and/or a hydraulic steering system. The hydraulic work system comprises at least one electric motor and at least one pump driven by the electric motor. The electric motor and/or the pump of the hydraulic work system is located inside the substantially closed axle housing.

Wakuta, as best seen in Figs. 1, 3, and 13, is directed to a wheel motor 37 supported on a main frame 40 by a swivel shaft 38. As shown particularly in Fig. 1, the wheel motor 37 has a casing 1 with a traction motor 6 inside the casing 1. The traction motor 6 is connected to a wheel hub 10 by an output rotary shaft 9. Wakuta has a cooling system to cool the traction motor 6. The cooling system has an oil reservoir 2*b* located at the bottom of the casing 1 and an oil pump 27 that circulates oil from the oil reservoir 2*b* through passageways defined in the casing 1 to cool the coil 6*d* of the motor 6. The oil is then returned to the reservoir 2*b*.

Wakuta does not teach or suggest a fork lift truck having a drive axle with at least one drive wheel located on each end of the drive axle, as claimed in claim 1. Rather, the Wakuta device is directed to wheel motors 37 that are attached at the sides of the vehicle so that the wheel motors 37 are free to turn around a central axis of the swivel shaft 38 and are movable up and down (Wakuta at column 9, lines 33-36). Additionally, Wakuta does not teach a hydraulic work system comprising a hoisting cylinder and/or a tilting cylinder and/or a hydraulic steering system with the hydraulic work system having at least one electric motor and at least one pump driven by the motor with the motor and/or the pump of the hydraulic work system located inside the drive axle of the vehicle. The oil pump 27 of Wakuta referred to by the Examiner is a small cooling pump that circulates oil from the oil reservoir 2*b* in the wheel motor to cool the coils of the traction motor 6. There is no teaching or suggestion in Wakuta to dispose the electric motor and/or the pump of a hydraulic hoisting cylinder, tilting cylinder, or hydraulic steering system inside an axle housing, as claimed in claim 1. Therefore, claim 1 is not anticipated by Wakuta.

Claims 4 and 19-24 depend either directly or indirectly from claim 1. Therefore, claims 4 and 19-24 are believed patentable over Wakuta for the same reasons as discussed above with respect to claim 1. Additionally, Wakuta does not teach or suggest the limitation of claim 19 that the electric motor of the hydraulic work system or the traction motor of the traction drive system is an oil-cooled electric motor connected with an oil circuit of the hoisting cylinder, tilting cylinder, or hydraulic steering system. In the Wakuta device, the small hydraulic pump 27 simply circulates oil within the confines of the casing 1 to cool the coil of the electric traction motor 6. With respect to claim 22, Wakuta does not teach a valve control device installed on the pump of the hydraulic work system with the valve control device integrated into the drive axle or fastened to the outside of the axle housing in the vicinity of the pump. With respect to claim 23, Wakuta does not teach or suggest an oil tank connected to the hydraulic work system (i.e., hoisting cylinder, tilting cylinder, or hydraulic steering system) integrated into the elongated drive axle or located immediately next to the drive axle. The oil reservoir 2*b* of the Wakuta device is simply a self-contained oil reservoir within the wheel motor 37 that is circulated by the pump 27 to cool the coil of the motor 6. Therefore, for all of the above reasons, claims 4 and 19-24 are believed patentable over the cited art and in condition for allowance. Reconsideration of the rejections of claims 4 and 19-24 is respectfully requested.

Rejections under 35 U.S.C. § 103(a)

a. Claims 2 and 3

Claims 2 and 3 stand rejected for obviousness over the teachings of Wakuta in view of the teachings of U.S. Patent No. 5,964,473 to Degonda et al. In view of the above amendments and the following remarks, reconsideration of these rejections is respectfully requested.

Wakuta has been discussed above.

In paragraph 2 of the Office Action, the Examiner relies upon Degonda for teaching an axle 157 having two traction electric motors 155 located on the ends of the drive axle 157 (Fig. 25).

Claims 2 and 3 depend from claim 1 and are believed allowable because Degonda, either alone or in combination with Wakuta, does not teach or suggest the invention of claim 1. Specifically, Wakuta and Degonda, either alone or in combination, do not fairly teach or suggest a fork lift truck having a traction drive system with a drive axle having at least one drive wheel on each end and that is substantially closed on all sides, with an electric motor and/or a pump of a hoisting cylinder, tilting cylinder, or hydraulic steering system located inside the axle housing. The Wakuta vehicle teaches independent wheel motors 37. The Degonda wheelchair appears to show in Fig. 25 a main axle 157 having an electric motor 155 located outside the main axle 157. Moreover, Applicant does not believe one of ordinary skill in the fork lift art would look to a wheelchair for modifying a fork lift traction drive. Therefore, claims 2 and 3 are believed allowable since they depend from independent claim 1. Additionally, claim 3 includes the limitation that the electric motor and/or the pump of the hydraulic work system (i.e., hoisting cylinder, tilting cylinder, or hydraulic steering system) is located axially between the traction motors inside the axle housing. In Wakuta, the small hydraulic pump that circulates oil from the reservoir 2*b* is located inside the casing 1 of the wheel motor 37. However, in the Degonda wheelchair, the electric motor 155 is clearly shown to be outside of the main axle 157. Therefore, neither Wakuta nor Degonda, either alone or in combination, teaches or suggests the electric motor and/or pump of a fork lift truck hydraulic work system located axially between the traction motors inside a substantially closed axle housing, as claimed in claim 3. Therefore, for all of the above reasons, claims 2 and 3 are believed patentable over the cited prior art and in condition for allowance.

b. Claims 5-12

Claims 5-12 stand rejected for obviousness over the teachings of Wakuta and Degonda in view of the teachings of U.S. Patent No. 5,289,905 to Braschler. In view of the above amendments and the following remarks, reconsideration of these rejections is respectfully requested.

Wakuta and Degonda have been discussed above. Braschler discloses a wheel assembly for large off-road mining vehicles which the Examiner relies upon for the teaching of electric disk rotor motors or hydraulic motors. As best seen in Fig. 2B, Braschler discloses a drive axle 19 affixed to a non-rotatable housing 40 positioned within a rotatable wheel rim 42 having pneumatic tires 44 and 46 mounted thereon. An electric motor 50 is attached to the housing 40 with the output drive shaft 52 of the motor 50 connected to a gear-drive system 54 and 56. A hydrodynamic retarder 60 is located at the opposite end of the electric motor 50 from the output drive shaft 52 and is interconnected with the output drive shaft 52. The hydrodynamic retarder 60 can also include a disc brake assembly 62. The hydrodynamic retarder 60 helps provide a constant braking torque throughout the speed range of the vehicle (Braschler at column 5, lines 1-3).

(i) Claims 5-7 and 9-12

Claims 5-7 and 9-12 depend either directly or indirectly from claim 1. Braschler, either alone or in combination with Wakuta and Degonda, does not teach or suggest the invention as claimed in claim 1. Specifically, Wakuta, Degonda, and Braschler do not teach or suggest a fork lift truck drive device having a traction drive system with a drive axle and an electric motor and/or a pump of the hoisting cylinder, tilting cylinder, or hydraulic steering system located inside the substantially closed axle housing. The Braschler system has an electric motor 50 located inside a portion of the housing 40 but with a hydrodynamic retarder 60 connected thereto. Therefore, claims 5-7 and 9-12 are believed allowable for depending from claim 1. Additionally, the Wakuta, Degonda, or Braschler combination does not teach or suggest the limitation of claim 6 that the traction motors are hydraulic motors having secondary regulation systems. The Braschler motors are electric motors having a hydrodynamic retarder.

(ii) Claim 8

Claim 8 is directed to a drive device having a traction drive system with a drive axle and hydraulic work system comprising a hoisting cylinder and/or a tilting cylinder and/or a hydraulic steering system. The hydraulic work system includes at least one electric motor and/or at least one pump driven by the electric motor. The traction drive system has two hydraulic traction motors having secondary regulation systems. An installed delivery capacity of the pump is designed to deliver a volume of fluid required by the hydraulic work system. The traction motors are connected to the pump of the hydraulic work system and the installed delivery capacity of the pump is in excess of the maximum amount required by the hydraulic work system.

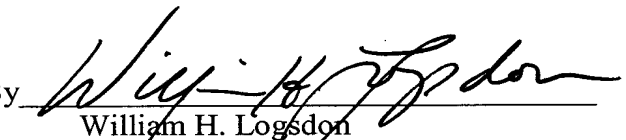
Neither Wakuta, Degonda, nor Braschler teaches or suggests the claimed drive system in which the traction motors are hydraulic motors having secondary regulation systems. In each of Wakuta, Degonda, and Braschler, the traction motors are electric motors. Additionally, none of the references teaches or suggests the limitation that the traction motors are connected to the pump of the hydraulic work system (i.e., the pump of the hoisting cylinder or tilting cylinder or hydraulic steering system) with the delivery capacity of the pump in excess of the maximum amount required by the hydraulic work system. As discussed in the pending specification, this limitation ensures that the hydraulic traction motors can be operated even when the hydraulic work system is operated at its maximum capacity. Therefore, reconsideration of the rejection of claim 8 is respectfully requested.

Conclusion

In view of the above amendments and remarks, Applicant believes claims 1-12 and 19-24, as amended, are patentable over the cited prior art and are in condition for allowance. Reconsideration of the rejections of claims 1-12 and 19-24 and allowance of all of claims 1-12 and 14-24 are respectfully requested.

Respectfully submitted,

WEBB ZIESENHEIM LOGSDON
ORKIN & HANSON, P.C.

By 

William H. Logsdon
Registration No. 22,132
Attorney for Applicant
700 Koppers Building
436 Seventh Avenue
Pittsburgh, PA 15219-1818
Telephone: (412) 471-8815
Facsimile: (412) 471-4094
E-mail: webblaw@webblaw.com